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IS 9079 (2002): Electric Monoset Pumps for Clear, Cold Water for Agricultural and Water Supply Purposes [MED 20: Pumps]



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IS 9079 : 2002

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कृषि और जलपूर्ति के लिये साफ और ठंडे
पानी के बिजली के मोनोसेट पम्प — विशिष्टि
(दूसरा पुनरीक्षण)

Indian Standard

ELECTRIC MONOSET PUMPS FOR CLEAR,
COLD WATER FOR AGRICULTURAL AND WATER
SUPPLY PURPOSES — SPECIFICATION

(Second Revision)

(First Reprint SEPTEMBER 2004)

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pumps Sectional Committee had been approved by the Mechanical Engineering Division Council

Monoset pumps are centrifugal pumps with inbuilt driving motor designed and built as a complete unit on one shaft. This eliminates motor shaft bearing and makes the combined unit simple and compact.

This standard was first published in 1979. In view of its implementation, the standard was revised in 1989 on the basis of the information received from the industry. The major changes were

- a) Introduction of IS 11346: 1985 'Testing set up for agricultural pumps' for testing of monoset pumps for agricultural purposes, and
- b) The efficiency charts were prepared scientifically on the basis of data collected from the manufacturers and fixing factors with respect to international figures after feeding in the computer. The efficiency values were to be reviewed/updated again after three years.

The following are some of the modifications carried out in this revision:

- a) Amendments 1, 2 and 3 have been reviewed and incorporated in the standard.
- b) Scope of monoset pumps extended from pumps for clear, cold water for agricultural purposes to pumps for clear cold water for agricultural and water supply purposes.
- c) Electrical testing for monoset pumps modified.

A large number of data relating to pump efficiencies were collected to assess the possibility of increase in efficiency. After analyzing the data and considering the scope for increase, minimum efficiency has been increased by 5 percent over the existing pump efficiency values.

It has been experienced that the pumps are certified at one particular duty point, being the best efficiency point but the requirements of user may be of pump of duty point different than the certified duty point which may otherwise fall within the specified head and discharge tolerances and the same pump without any alteration may also meet the performance requirements at user's required duty point. To cover certification of such pumps without testing again, the concept of 'Nominal Rating' for the duty point has been introduced in this revision. On this nominal rating, specified tolerances may be made applicable so that there is no need to test the pump again at user's required duty point which fall within the tolerance and may be certified as such provided the pump meets all other requirements of standard at the user's required duty point. However, it would be desirable and more useful to apprise the user that certified pump at user's required duty point may conveniently be used, if within the specified tolerance of 'Nominal' duty point and meeting other performance characteristics at user's required duty point rather than certifying the same pump again at user's required duty point.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2: 1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 MAY 2006
TO
IS 9079 : 2002 ELECTRIC MONOSET PUMPS
FOR CLEAR, COLD WATER FOR AGRICULTURAL AND
WATER SUPPLY PURPOSES — SPECIFICATION
(Second Revision)

[Page 10, Table 6, Notes] — Insert the following Note at the end

‘3 Maximum current limits specified are for 415 volt rated voltage. For other voltages, it shall be in inverse proportion to rated voltage.’

[Page 11, Table 7, Notes] — Insert the following Note at the end

‘3 Maximum current limits specified are for 240 volt rated voltage. For other voltages, it shall be in inverse proportion to rated voltage.’

(MED 20)

Indian Standard

ELECTRIC MONOSET PUMPS FOR CLEAR, COLD WATER FOR AGRICULTURAL AND WATER SUPPLY PURPOSES — SPECIFICATION (Second Revision)

1 SCOPE

This standard specifies the technical requirements for electric monoset pumps for handling clear, cold water for agricultural and water supply purposes

2 REFERENCES

The Indian Standards listed at Annex A contain provisions which, through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards

3 UNITS, TERMINOLOGY AND CLASSIFICATION

Units, terminology and classification relating to pumps shall be as specified in IS 5120 and for motors as specified in IS 1885 (Part 35), IS 7538 and IS 14582 as may be applicable. In addition, following terminology shall also apply

3.1 Manometric Suction Lift — Manometric suction lift is the vacuum gauge/suction manometer reading in metre of water column when pump operates at suction lift

4 CHARACTERISTICS OF CLEAR, COLD WATER

Characteristics of clear, cold water are specified below

- | | |
|---------------------|-------------------------------------|
| a) Turbidity | 50 ppm (silica scale), <i>Max</i> |
| b) Chlorides | 500 ppm, <i>Max</i> |
| c) Total solids | 3 000 ppm, <i>Max</i> |
| d) pH value | 6.5 to 8.5 |
| e) Temperature | 33°C, <i>Max</i> |
| f) Specific gravity | 1.004, <i>Max</i> |
| g) Hardness | 300, <i>Max</i>
(drinking water) |

NOTE — If any characteristic of water differs from these specifications, the pump constructional details shall be agreed between the manufacturer/supplier and the user, and shall be specified in the order

5 NOMENCLATURE

Nomenclature of the pump parts commonly used in

monoset pumps shall be as given in Fig. 1 and 2 read with Table 1.

6 MATERIAL OF CONSTRUCTION

6.1 It is recognized that a number of materials of construction are available to meet the needs for pumps handling clear, cold water. A few typical materials are indicated below merely for guidance of the manufacturer and the user

Sl No	Component	Material of Construction
i)	Casing	Casting grade FG 200 of IS 210
ii)	Impeller	Casting grade FG 200 of IS 210 or bronze grade LTB 2 of IS 318
iii)	Casing ring and impeller ring (if provided)	Casting grade FG 200 of IS 210 or bronze grade LTB 2 of IS 318
iv)	Shaft	Class 3A of IS 1875
v)	Shaft sleeve (if provided)	Bronze grade LTB 2 of IS 318 or stainless steel grades X 04 Cr 12, X 12 Cr 12 or X 20 Cr 13 of IS 6603 or IS 6911
vi)	Bush	Bronze grade LTB 2, 3 or 4 of IS 318 or nitrile/cutless rubber

NOTES

1 The material listed are to be considered as only typical and indicative of minimum requirement of the material properties. The use of materials having better properties is not prejudiced by the details provided above

2 To get benefit from advancement in technology of plastics, thermoplastic materials, such as polyphenylene oxide (PPO), polycarbonate, acetal, nylon 66, PTFE, etc., may be used for pump parts like shaft sleeves, casing, impeller, wearing rings, glands, etc.

3 It is recommended to use MOS2 lubricated gland packing if stainless steel shaft sleeve is used

6.2 Gaskets, Seals and Packings

Gaskets, seals and packings used for clear, cold water pumps may conform to those specified in IS 5120

7 DIRECTION OF ROTATION

7.1 The direction of rotation of pumpset is designated clockwise or anti-clockwise as observed when looking at the pump shaft from the driving end

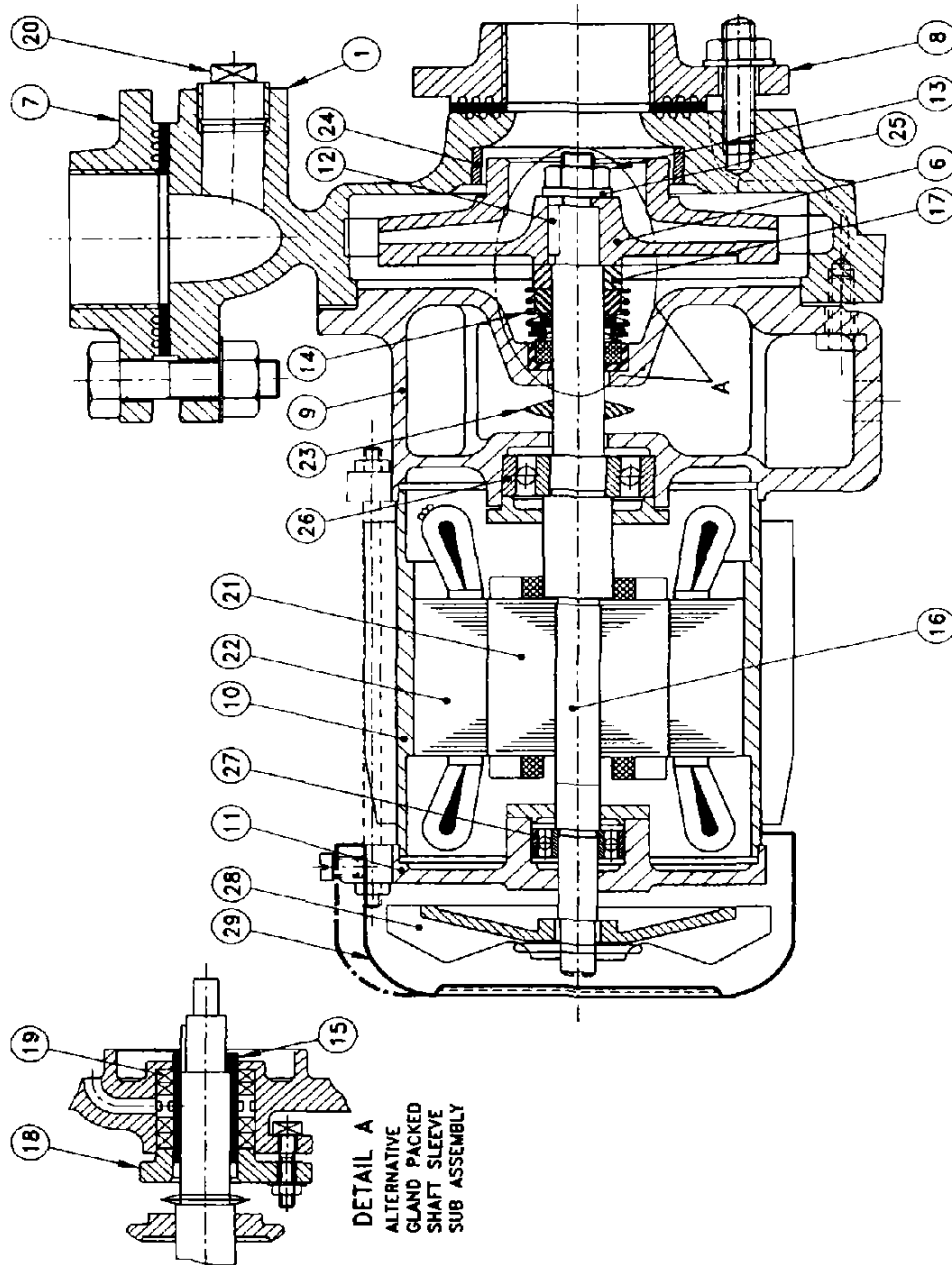


FIG 1 TYPICAL ILLUSTRATION OF SINGLE STAGE MONOBLOCK PUMP

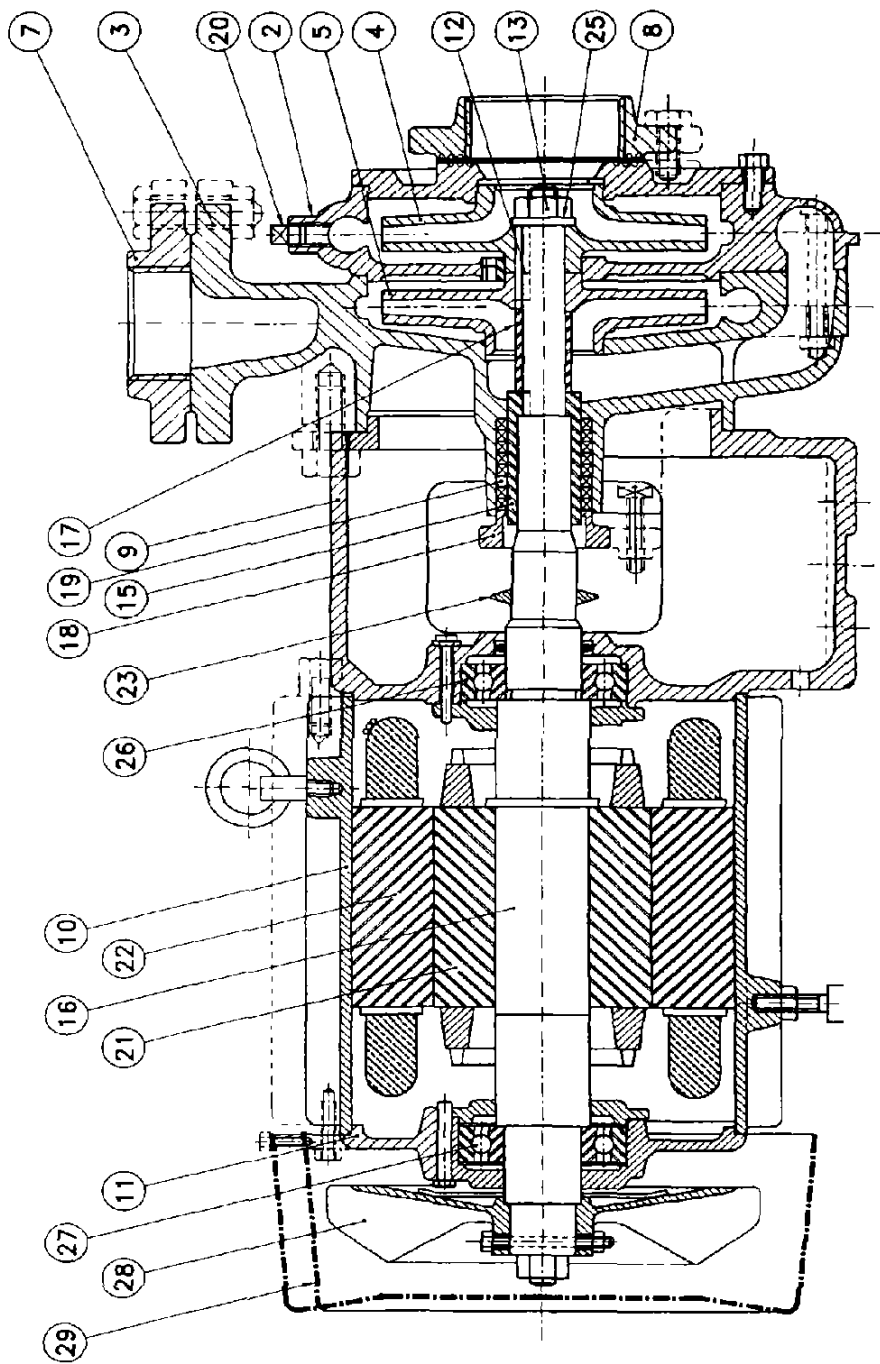


FIG. 2 TYPICAL ILLUSTRATION OF DOUBLE STAGE MONOBLOCK PUMP

Table 1 Nomenclature
(Clause 5 and Fig 1 and 2)

Part No.	Name of Part	Brief Description
1	Delivery casing	A portion of the pump which houses the impeller and includes the volute
2	Delivery casing — First stage	A portion of the pump which houses the first stage impeller and includes the volute
3	Delivery casing — Second stage	A portion of the pump that houses the second stage impeller and includes the volute
4	Impeller — First stage	A first stage rotating element producing head
5	Impeller — Second stage	A second stage rotating element producing head
6	Impeller	A rotating element producing head
7	Delivery flange	A part that secures delivery pipe to delivery bore
8	Suction flange	A part that secures suction pipe to suction bore
9	Mounting casing	A casting component in monoblocs, accommodating pump on one side and motor on the other
10	Motor body	Houses wound stator sub-assembly and dissipate heat produced in wound stator through its fins
11	Cover N D E	A protective cover for bearing and motor
12	Impeller key	A parallel-sided piece used to prevent the impeller from rotating relative to the shaft
13	Impeller nut	A threaded piece used to secure the impeller on the shaft usually provided complete with locking device
14	Mechanical seal (Rotating element)	A flexible device mounted on the shaft in stuffing box and having lapped sealing face held against the stationary sealing face
	Mechanical seal (Stationary element)	A sub-assembly consisting of one or more parts mounted on the stuffing box and having a lapped sealing face
15	Shaft sleeve	A replaceable sleeve for protecting the shaft where it passes through the stuffing box and stage bushings
16	Shaft	A shaft which holds the rotating impeller and transmits the power
17	Spacer	A cylindrical piece used to maintain desired clearance
18	Gland	A follower which compresses packing in a stuffing box
19	Gland packing	A pliable lubricated material used to provide a seal around the portion of the shaft located in the stuffing box
20	Priming plug	A part to facilitate priming
21	Rotor	Converts electromagnetic energy into mechanical energy by utilizing magnetic path created by stator
22	Wound stator	Converts electrical energy (obtained from power supply) to magnetic energy
23	Water deflector	A device to protect bearings by slinging off stuffing box leakage
24	Wearing ring	A replaceable ring which maintains the desired radial clearance between impeller and casing
25	Washer	A part used to prevent loosening nut and also to distribute the force exerted on connected parts
26	Ball bearing D E	Rolling bearing
27	Ball bearing N D E	Rolling bearing
28	Fan	Circulates air for cooling motor body
29	Fan cover	Prevents contact between rotating part (fan) and external objects like human organs

7.2 The direction of rotation shall be clearly and securely marked by incorporating an arrow on the pumpset

8 FACTORS AFFECTING PUMP PERFORMANCE

Factors affecting the pump performance shall be the same as those specified in IS 5120

9 DESIGN FEATURES

9.1 Prime mover shall not get overloaded in the following head range:

For guaranteed duty head

20 m or less	+10 percent to -20 percent of guaranteed duty head
More than 20 m	+5 percent to 20 percent of guaranteed duty head.

(The overloading of the prime mover shall be that condition when the current drawn by the prime mover exceeds the maximum permissible current limit specified in Table 6.)

9.2 The pump shall be capable to perform as per guaranteed duty point at the manometric suction lift as specified in Table 2.

Table 2 Manometric Suction Lift for Various Discharge Rates and Speed Segments at Mean Sea Level and at 33°C Water Temperature
(Clause 9.2)

Manometric Suction Lift (m)	Discharge Rate Range (l/s)	
	4-Pole	2-Pole
6.0	Up to 72	Up to 24
5.5	72-93	24-29
5.0	—	29-33.5
4.5	—	33.5-38.5
4.0	—	38.5-43.5
3.5	—	43.5-50

NOTE — While the manometric suction lift indicated is to be maintained at guaranteed duty discharge rate, it may not be always practically possible. Hence, the requirement of 9.1 and 9.2 shall be deemed to have met if the manometric suction lift is maintained at discharge rate within -5 percent to +10 percent of guaranteed discharge rate

9.3 Voltage and Frequency Variation

9.3.1 Monoset shall be capable to operate in the following range of voltage and supply frequency

- Voltage +6 percent to -15 percent of rated voltage
- Frequency +3 percent to -3 percent of rated frequency
- Any combination of (a) and (b)

10 PUMP TEST

10.1 The testing of the pumps shall be in accordance with IS 11346

10.2 The sampling and criteria of conformity for hydraulic performance shall be as per Table 3

Table 3 Sampling and Criteria of Conformity for Hydraulic Performance of Monoset Pumps
(Clause 10.2)

No. of Pumps in Lot	Sample Size	Acceptance No.
Up to 7	1	0
8 to 15	2	0
16 to 25	3	0
26 to 50	4	0
51 to 100	5	0
101 to 150	8	0
151 to 300	13	0
301 to 500	20	0
501 to 1 000	32	1
1 001 and above	50	2

11 TEST FOR ELECTRICAL PERFORMANCE FOR MONOSET

Routine and type test on monoset shall be performed as specified in 11.1 and 11.2. The general requirements of the motor with regard to type of enclosures, methods of cooling, duty-rating and earthing shall be in accordance with IS 7538 or IS 14582. While conducting routine and type tests on monoset pump for electrical performance, supply frequency shall be within ± 3 percent of rated frequency.

11.1 Routine Test

Following shall constitute the routine test for electrical performance on motor

- High voltage test
- Insulation resistance test
- Test for no load current and power input at rated voltage and supply frequency
- Locked rotor test for locked rotor current, power input at a suitable voltage and supply frequency
- Reduced voltage running up test shall be conducted at a voltage not exceeding 75 percent of voltage in case of single phase monoset and 60 percent of the rated voltage in case of three-phase monoset to check the ability of the motor to attain full speed

NOTE — In case of three-phase motor for monosets, the value of the current (amperes) shall be the average value of currents (amperes) measured in all the three phases

The requirements and values shall be in accordance with those specified in IS 7538 or IS 14582 as may be applicable

11.2 Type Test

11.2.1 The type test for motor for monoset pumps shall comprise of routine tests, measurement of stator resistance and temperature rise test as given in 11.2.3

11.2.2 The sampling and criteria of conformity for type test shall be as per Table 4

Table 4 Sampling and Criteria of Conformity of Monosets Pumps for Type Test
(Clause 11.2.2)

No. of Pumps in Lot	Sample Size	Acceptance No.
Up to 25	1	0
26 to 50	2	0
51 to 100	3	0
Above 100	4	0

11.2.3 Temperature Rise Test

Temperature rise test shall be conducted for windings at the rated voltage and at 85 percent of the rated voltage and supply frequency within ± 3 percent of rated frequency. Set the load for the maximum current point in the operating head range of the electric monoset at the rated voltage and supply frequency and conduct temperature rise test. Without changing this load, turn the voltage to 85 percent of the rated voltage and conduct the temperature rise test. The temperature rise at rated voltage condition shall not exceed the limits specified in Table 5.

The temperature rise at 85 percent of rated voltage condition shall not exceed the limits specified in Table 5 by more than 10°C.

NOTE — For conducting temperature rise test, the pump itself shall be used for loading the motor.

Table 5 Limits of Temperature Rise, °C
(Clause 11.2.3)

Part of Electric Monoset	Class of Insulation							
	A		E		B		F	
	T	R	T	R	T	R	T	R
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Windings	50	60	65	75	70	80	85	105
T	Thermometer method							
R	Resistance method							

12 GENERAL REQUIREMENTS

12.1 The general requirements for the pump shall be as given in IS 5120

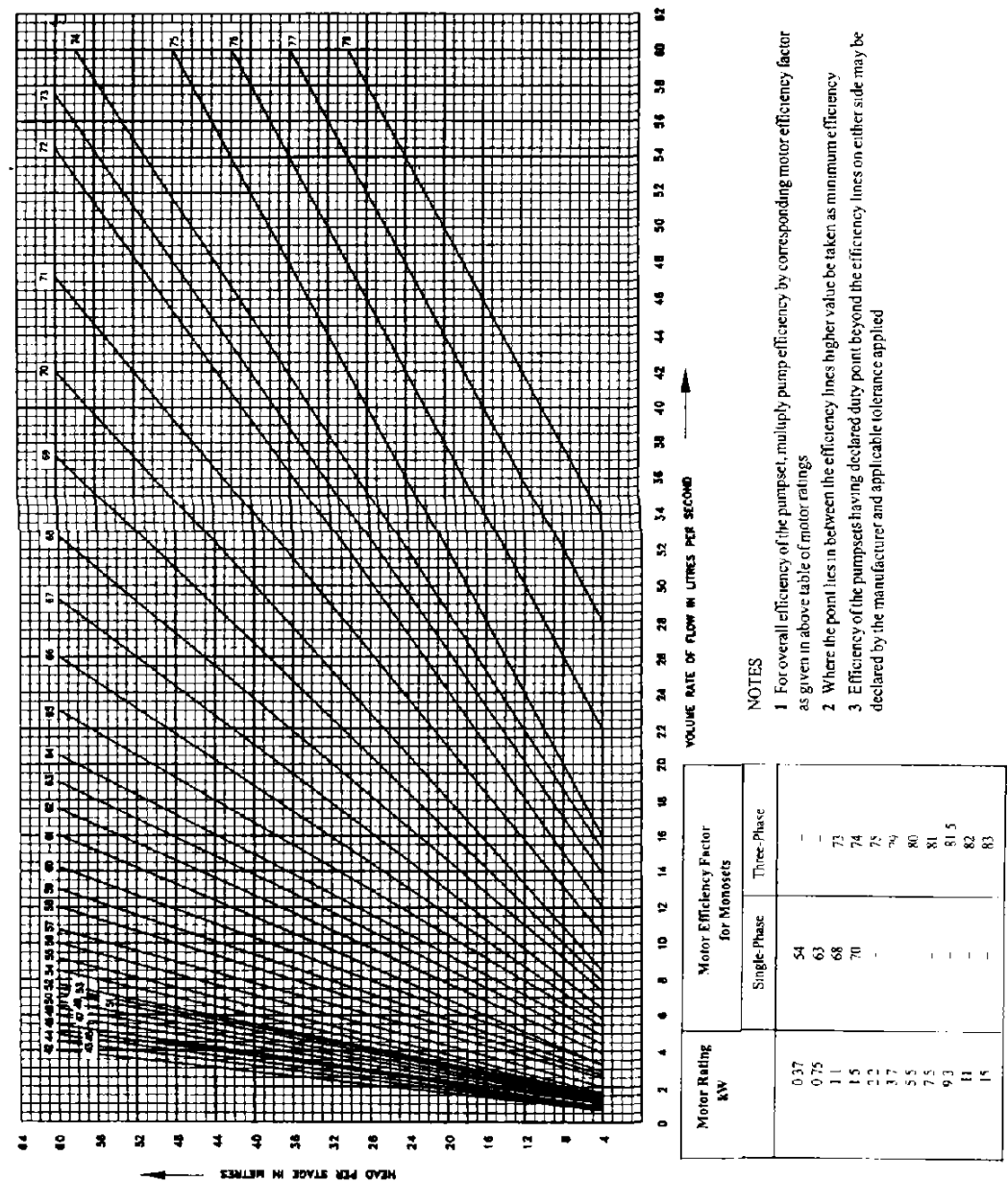
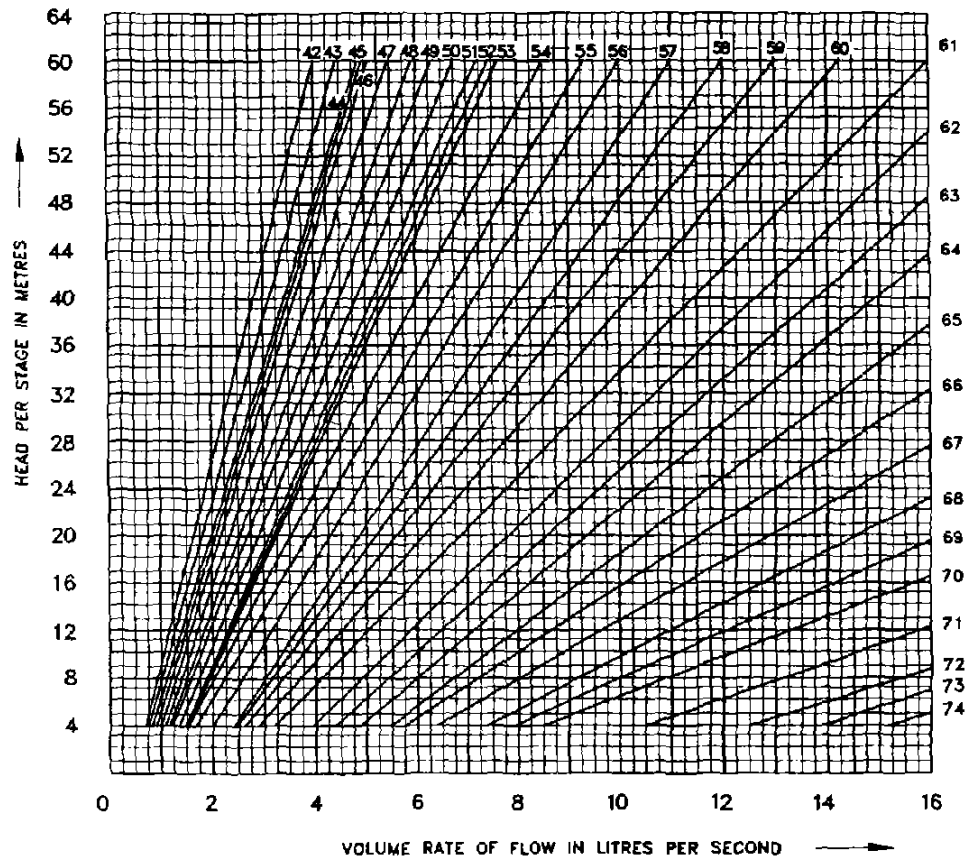


FIG 3 MINIMUM EFFICIENCY IN PERCENT FOR MONOSET PUMP FOR AGRICULTURAL PURPOSES (2-POLE 50 Hz) (FOR VOLUME RATE OF FLOW ABOVE 16 LITRES PER SECOND)

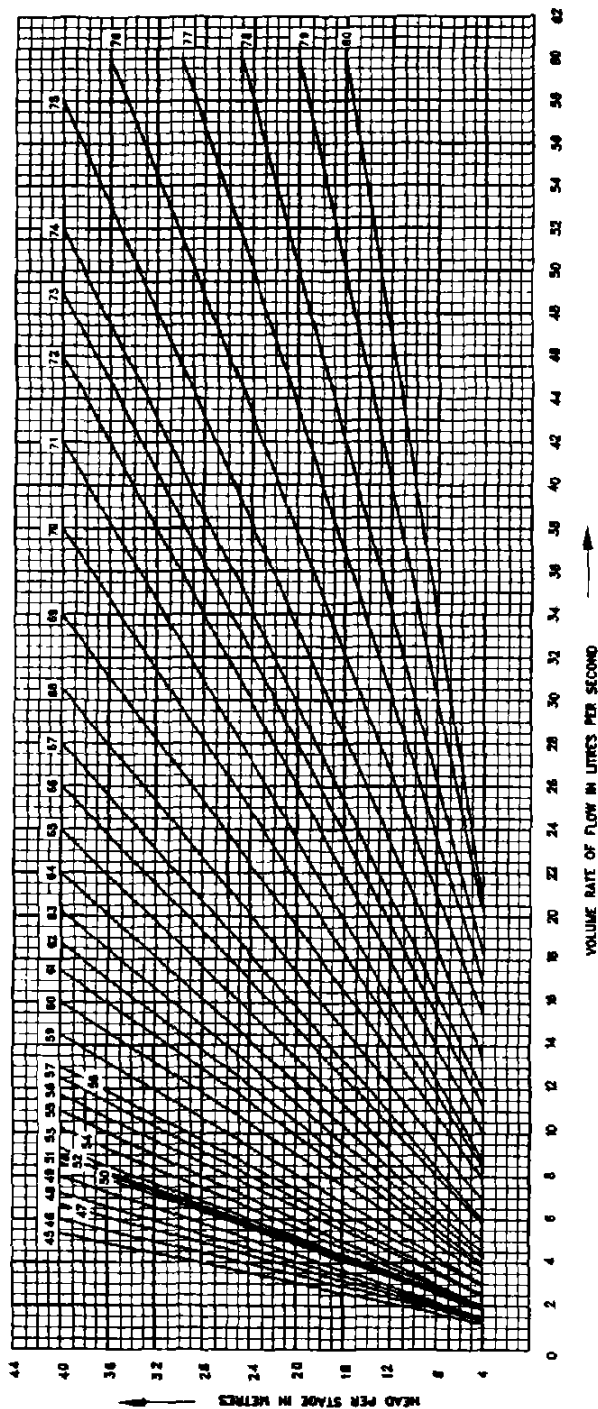


Motor Rating kW	Motor Efficiency Factor for Monosets	
	Single-Phase	Three-Phase
0.37	54	—
0.75	63	—
1.1	68	73
1.5	70	74
2.2	—	75
3.7	—	79
5.5	—	80
7.5	—	81
9.3	—	81.5
11	—	82
15	—	83

NOTES

- 1 For overall efficiency of the pumpset, multiply pump efficiency by corresponding motor efficiency factor as given in above table of motor ratings
- 2 Where the point lies in between the efficiency lines higher value be taken as minimum efficiency
- 3 Efficiency of the pumpsets having declared duty point beyond the efficiency lines on either side may be declared by the manufacturer and applicable tolerance applied

FIG. 4 MINIMUM EFFICIENCY IN PERCENT FOR MONOSET PUMP FOR AGRICULTURAL PURPOSES (2-POLE 50 Hz)
(FOR VOLUME RATE OF FLOW UP TO AND INCLUDING 16 LITRES PER SECOND)

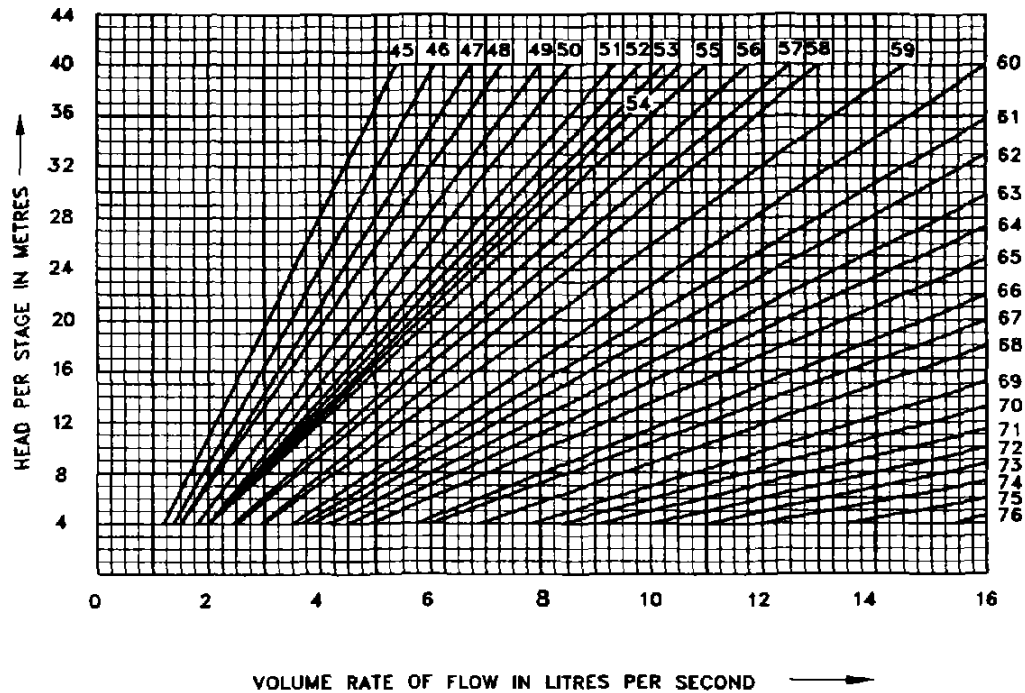


NOTES

- 1 For overall efficiency of the pumpset, multiply pump efficiency by corresponding motor efficiency factor as given in above table of motor ratings
- 2 Where the point lies in between the efficiency lines higher value be taken as minimum efficiency
- 3 Efficiency of the pumpsets having declared duty point beyond the efficiency lines on either side may be declared by the manufacturer and applicable tolerance applied

Motor Rating kW	Motor Efficiency Factor for Monoset	
	Single-Phase	Three-Phase
0.37	56	-
0.75	66	-
1.1	70	76
1.5	72	77
2.2	-	77.5
3.7	-	80
5.5	-	82
7.5	-	83
9.3	-	85
11	-	85.5
15	-	86

FIG 5 MINIMUM EFFICIENCY IN PERCENT FOR MONOSET PUMP FOR AGRICULTURAL PURPOSES (4-POLE 50 Hz) (FOR VOLUME RATE OF FLOW ABOVE 16 LITRES PER SECOND)



Motor Rating kW	Motor Efficiency Factor for Monose	
	Single-Phase	Three-Phase
0.37	56	—
0.75	66	—
1.1	70	76
1.5	72	77
2.2	—	77.5
3.7	—	80
5.5	—	82
7.5	—	83
9.3	—	85
11	—	85.5
15	—	86

NOTES

- 1 For overall efficiency of the pumpset, multiply pump efficiency by corresponding motor efficiency factor as given in above table of motor ratings
- 2 Where the point lies in between the efficiency lines higher value be taken as minimum efficiency
- 3 Efficiency of the pumpsets having declared duty point beyond the efficiency lines on either side may be declared by the manufacturer and applicable tolerance applied

FIG. 6 MINIMUM EFFICIENCY IN PERCENT FOR MONOSET PUMP FOR AGRICULTURAL PURPOSES (4-POLE 50 Hz)
(FOR VOLUME RATE OF FLOW UP TO AND INCLUDING 16 LITRES PER SECOND)

IS 9079 : 2002

12.2 Pump casing shall be of robust construction and shall be tested to withstand 1.5 times the maximum discharge pressure for 2 min

12.3 Impeller

In case of 2-pole monoset, the impeller and rotor shall be dynamically balanced to grade 6.3 of IS 11723 (Part 1)

In case of 4-pole monoset, the impeller shall be statically or dynamically balanced and rotor shall be dynamically balanced to grade 6.3 of IS 11723 (Part 1)

NOTE — Balancing here means the balancing of the unbalanced rotating mass in the impeller and not balancing of the axial hydraulic thrust in the impeller

12.4 Shaft

The shaft shall be of adequate size to transmit the required power.

12.5 Efficiency

The overall efficiency of monoset pumps at duty point as declared by the manufacturer for 2 and 4-poles shall not be less than given in Fig 3 to 6 and beyond this range, the efficiency shall be declared by the manufacturer

13 GUARANTEES AND TOLERANCES ON PUMP PERFORMANCE

13.1 Guarantee of Workmanship and Material

The pumpset shall be guaranteed by the manufacturer against defects in material and workmanship, under normal use and service, for a period of at least 15 months from the date of dispatch or 12 months from the date of commissioning whichever is less

13.2 Guarantee of Performance

The pumpset shall be guaranteed for their performance of the nominal volumic rate of flow and the nominal head at the guaranteed point. The overall efficiency of the pumpset shall be guaranteed at the declared point only. The overall efficiency of the pumpset declared by manufacturer shall not be less than those given in Fig 3 to 6

NOTES

1 Pump performance shall be declared at the rated voltage and rated frequency. Following affinity laws shall be applied for correction of performance at rated frequency

$$\begin{array}{lcl} Q & \propto & f \\ H & \propto & f^2 \\ P & \propto & f^3 \end{array}$$

No correction shall be applied for overall efficiency

2 The pumpset shall be guaranteed at the nominal duty point. The same pumpset may also be deemed to have met the guarantee if the new duty point lies within the specified tolerance of head (± 4 percent) and discharge (± 7 percent) of nominal duty point and meets all other pump performance characteristics specified

13.2.1 The guarantee shall be deemed to have been met with, if the measured values of head, volume rate of flow and overall efficiency are within the limits indicated in IS 11346

However, after applying the tolerance, overall efficiency value shall not be less than that derived from Fig 3 to 6.

Monoset motor shall not get overloaded in the specified operating head range at rated voltage and supply frequency. The overloading of motor is that condition when maximum current drawn by the motor exceeds the limit specified in Tables 6 to 8

Table 6 Maximum Limit of Permissible Current in Operating Head Range of Three-Phase, 415 V Monosets for Checking the Non-overloading Requirements
(Clause 13.2.1)

Rating of Monoset kW	Rated Current of Motor (Maximum) (as Specified in IS 7538)		Permissible Limit of Maximum Current at Rated Voltage and Frequency Within ± 3 Percent of Rated Frequency	
	2-Pole	4-Pole	2-Pole	4-Pole
(1)	(2)	(3)	(4)	(5)
0.37	1.3	1.5	1.4	1.6
0.55	1.7	1.8	1.8	1.9
0.75	2.1	2.3	2.2	2.45
1.1	2.9	3.0	3.1	3.2
1.5	3.9	4.0	4.2	4.3
2.2	5.2	5.3	5.6	5.7
3.7	8.3	8.4	8.9	9.0
5.5	11.4	11.9	12.2	12.7
7.5	15.6	16.0	16.7	17.0
9.3	19.5	19.2	20.8	20.5
11	22.4	22.9	24.0	24.5
15	30.2	31.2	32.3	33.4

NOTES

1 Values in col 4 and 5 are 1.07 times the values given in col 2 and 3 respectively to take care of voltage and frequency variation

2 The permissible limit of maximum current above 15 kW shall be as declared by the manufacturer

13.2.2 The tolerance shall apply to guaranteed duty point only

13.3 Suction Limitations

Suction limitations affecting the performance of pumps for clear, cold water shall be the same as those specified in IS 5120.

13.4 Correction for Altitude and Temperature

While carrying out verification test for manometric suction lift, correction shall be applied to manometric suction lift figures as specified in Table 2 for altitude at the test and water temperature other than 33°C. These corrections shall be in accordance with 13.4.1 and 13.4.2.

13.4.1 Correction for Altitude

Barometric pressure at the test place shall be recorded. The difference between the atmospheric pressure at mean sea level, that is, 10.33 mWC and the barometric pressure recorded at the test place shall be deducted from the manometric suction lift figures given in Table 2.

Table 7 Maximum Limit of Permissible Currents in Operating Head Range of Single-Phase Monosets for Checking the Over Loading 240 V, Capacitor Start Capacitor Run and Capacitor Start and Run Motors
(Clause 13.2.1)

Rating of Monoset kW	Rated Current of Motor (Maximum) (as Specified in IS 14582)		Permissible Limit of Maximum Current at Rated Voltage and Frequency Within ± 3 Percent of Rated Frequency	
	2-Pole	4-Pole	2-Pole	4-Pole
(1)	(2)	(3)	(4)	(5)
0.18	2.1	2.1	2.25	2.25
0.25	2.8	2.8	3.0	3.0
0.37	3.7	3.9	4.0	4.15
0.55	5.0	5.3	5.35	5.65
0.75	6.2	6.6	6.6	7.0
1.1	8.6	9.1	9.2	9.7
1.5	11.5	12.2	12.3	13.0

NOTES

1 Values in col 4 and 5 are 1.07 times the values given in col 2 and 3 respectively to take care of voltage and frequency variation.

2 The permissible limit of maximum current above 1.5 kW shall be as declared by the manufacturer.

Table 8 Maximum Limit of Permissible Currents in Operating Head Range of Single-Phase Monosets for Checking the Non-overloading 240 V, Capacitor Start Induction Motors
(Clause 13.2.1)

Rating of Monoset kW	Rated Current of Motor (Maximum) (as Specified in IS 14582)		Permissible Limit of Maximum Current at Rated Voltage and Frequency Within ± 3 Percent of Rated Frequency	
	2-Pole	4-Pole	2-Pole	4-Pole
(1)	(2)	(3)	(4)	(5)
0.18	2.9	3.0	3.1	3.2
0.25	3.7	3.9	3.95	4.2
0.37	5.1	5.4	5.45	5.8
0.55	7.3	7.6	7.8	8.1
0.75	9.0	9.5	9.6	10.1
1.1	12.5	12.9	13.3	13.8
1.5	16.3	16.8	17.4	17.9

NOTES

1 Values in col 4 and 5 are 1.07 times the values given in col 2 and 3 respectively to take care of voltage and frequency variation.

2 The permissible limit of maximum current above 1.5 kW shall be as declared by the manufacturer.

13.4.2 Correction for Temperature

Manometric suction lift specified in Table 2 modified as specified in 13.4.1 shall be increased further or reduced as given in Table 9 whenever water temperature is below or above 33°C.

Table 9 Correction in Manometric Suction Lift for Water Temperature Beyond 33°C
(Clause 13.4.2)

Water Temperature °C	Vapour Pressure mWC	Correction in Manometric Suction Lift Above and Below 33°C Water Temperature
10	0.13	+0.39
15	0.18	+0.34
20	0.24	+0.28
25	0.33	+0.19
30	0.43	+0.09
33	0.52	+0.00
35	0.58	-0.06
40	0.76	-0.24
45	1.00	-0.48
50	1.28	-0.76

14 RATINGS

The standard ratings of the motors of monoset pumpsets shall be 0.37, 0.55, 0.75, 1.1, 1.5, 2.2, 3.7, 5.5, 7.5, 9.3, 11 and 15 kW. Standard rating is always output of the motor.

NOTE — Rating above 15 kW may be as declared by the manufacturer.

15 PERMISSIBLE INACCURACIES IN MEASUREMENTS

15.1 In all commercial acceptance tests for agricultural pumps, a certain tolerance shall be allowed to the manufacturer on his guarantee to cover the inaccuracies of the equations for volume rate of flow, errors of observation and unavoidable errors of the instruments employed.

15.2 The permissible inaccuracy in the measurement of various quantities and all pertinent apparatus used shall be as indicated in IS 11346. However, measuring equipments with higher accuracy class may also be used.

16 MARKING AND PARAMETERS TO BE DECLARED BY THE MANUFACTURER

16.1 The monoset pumps shall be marked with the following parameters, which shall be declared by the manufacturer:

- Type, size and SI No. of monoset pump;
- Numbers of poles, total head, volume rate of flow at the guaranteed duty point,

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- c) Operating head range,
- d) Overall efficiency at guaranteed duty point;
- e) Motor rating (kW);
- f) Class of insulation of motor,
- g) Rated frequency (Hz),
- h) Number of phases,
- i) Rated voltage and winding connection,
- j) Maximum current (amperes) at maximum load, and
- k) Manufacturer's name or trade-mark

16.1.1 The manufacturer's brand name or logo shall

be embossed or indented on the pumpset casing.

16.2 BIS Certification Marking

16.2.1 The monoset pumps may also be marked with BIS Standard Mark.

16.2.2 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

IS No	Title	IS No	Title
210 : 1993	Grey iron castings — Specification (fourth revision)	7538 : 1996	Specification for three-phase squirrel cage induction motors for centrifugal pumps for agricultural applications (first revision)
318 : 1981	Specification for leaded tin bronze ingots and castings (second revision)	11346 : 2002	Code of acceptance tests for agricultural and water supply pumps (first revision)
1875 : 1992	Carbon steel billets, blooms, slabs and bars for forgings — Specification (fifth revision)	11723 (Part 1) : 1992	Mechanical vibration — Balance quality requirements of rigid rotors Part 1 Determination of permissible residual unbalance (first revision)
1885 (Part 35) : 1993	Electrotechnical vocabulary Part 35 Rotating machines (first revision)	•	
5120 : 1977	Technical requirements for rotodynamic special purpose pumps (first revision)	14582 : 1998	Single-phase small a.c. electric motors for centrifugal pumps for agricultural applications
6603 : 2001	Stainless steel bars and flats — Specification (first revision)		
6911 : 1992	Stainless steel plate, sheet and strip — Specification (first revision)		

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Amendments Issued Since Publication

Amend No	Date of Issue	Text Affected

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